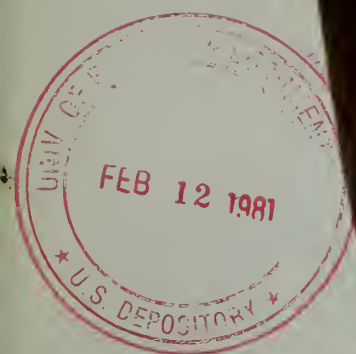


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Combat Crew

strategic air command



FEBRUARY 1981

"Regulations may only replace chance with error"

The Old Philosopher

WHAT THE GENERAL REALLY MEANT

Maj Richard Szafranski
Hq SAC, Offutt AFB

General LeMay was reminiscing the early years of his career at an after dinner speech a few months ago. He told a series of interrelated stories that ended with what I thought was a remarkable admission: "Regulations are only useful when you don't know the correct thing to do." This, from the founding father of Air Force standardization, the creator of crew technical orders and the inventor of memory bold print emergency procedures! But the more you think about it, the more sense it makes until you're compelled to admit that, yes, *regulations exist principally to reduce the uncertainties extant in the performance of people and things*. "Reduce" not "eliminate."

The truth is uncertainty, and its companion risk, cannot be eliminated. People, objects and the environment are in a constant and dynamic state of flux. People are always in the process of change; becoming stronger or weaker, more or less conscientious, learning or forgetting, being elated or depressed. Similarly, objects are always breaking in, wearing out, malfunctioning or just plain breaking. The environment, and by this I mean more than the ever-changing weather, is also variable. People and objects interact in infinitely various and novel combinations. Regulations can do little more than attempt to control the most mundane of operations by preventing us from doing some of the many absolutely stupid things we might otherwise do. But therein is their shortcoming: in attempting to prevent bad or stupid behaviors they do not necessarily encourage good or smart ones.

A couple of cases in point. In a recent FB-111 accident a pilot made a low altitude turn to exit a low level route and, for one reason or another,

allowed his speed to decrease to the point where the aircraft stalled. The pilot apparently followed prescribed stall recovery procedures by reducing his angle of attack and adding power. But low altitude stall recoveries are tricky business and the aircraft was lost. When the investigation board briefed the senior SAC staff on their findings, a sagacious general officer and former test pilot asked "Why don't you also sweep your wings forward as part of the recovery procedure?" Although nothing in the technical order forbids a pilot from doing that, the prescribed procedure somehow communicated the inference that a deviation from the procedures was not advisable.

In the same vein, a recent Titan accident was caused when a heavy wrench socket was dropped from a great height and punctured the missile's skin. None of the numerous regulations governing missile maintenance clearly required that sockets be secured by lanyards, but none of them forbade it either. The point in both of these cases, and I'll add some more examples in a bit, is that we spend too much time trying to learn what we should not do and not enough time trying to figure out what we should do.

Let me relate a couple of non-lethal personal experiences that illustrate this. One evening on alert my 250 pound EW rebounded a basketball and came down squarely on my 145 pound navigator, breaking his ankle. We got the nav to the emergency room where they put him in a cast from knee to toe. Since he was scheduled to be on alert for three more days I called my supervisor and asked that we be given a substitute navigator. The reasons were clear to me: he couldn't run across an icy ramp or climb the entry ladder unassisted in response to a klaxon, and if we were launched and went to war he

Combat Crew

Magazine of the Strategic Air Command - 31st Year of Publication

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could not make an emergency egress. Also, his toes kept turning blue. After harangues up and down the lower levels of the local chain of command, and repeated advisories that nothing "in the regulations" prohibits folks with leg casts from pulling alert, I caved in. The only concession I won was a wool sock for the nav's toes. What I intuitively felt then is crystal clear to me now: If safety truly were important, the correct thing would have been to take him off alert, regulations notwithstanding.

The last case I'll relate occurred about five years ago. The "old guard" CEVG scheduled an evaluation with our chief of standardization, a crewless bomber pilot with a slug of hours and experience in the B-52H. The flight was scheduled for one of those snowy days common at Base X. During preflight, crew chiefs swept the aircraft with brooms to remove most of the snow. They missed a big hunk on the top of the white radome right below the front windows. No problem. The runway was slick, there was a 15 knot direct cross requiring a couple of degrees of crosswind crab, the ceiling was low but the visibility was good. After the pilot applied takeoff power, the aircraft began to accelerate rapidly as the eight big fans sucked up that cold air they use so well. While concentrating on steering with crab in, and making the ten per nano-second crosschecks necessary during a takeoff, this experienced pilot was momentarily distracted when that last remaining chunk of snow departed the radome and splattered into the window, exactly as the aircraft accelerated through 70 knots. That specific speed is important because the pilot is required by the B-52H technical order to announce "70 knots-Now" so that timing for a proper acceleration check can be made.

When the pilot returned his eyes to the

Continued on Page 19



ON OUR COVER

MK-82 500-pound bombs are slung under the wings of SAC's B-52. They are also carried in the aircraft's bomb bay.

SACRP 127-1

VOL. XXXI NO. 2

FEBRUARY 1981

COMBAT CREW is an internal publication of the Strategic Air Command with the sole purpose of promoting safety. The contents of this magazine are informative and not to be considered as directive in nature. Facts, testimony and conclusions of all mishaps printed herein may not be construed as incrimination under Article 31 of the Uniform Code of Military Justice. All names, dates and places used in conjunction with mishap stories are fictitious. Written permission must be obtained from Headquarters, Strategic Air Command, before any material may be reprinted by other than U.S. Air Force organizations. Use of funds for printing the publication has been approved by Hq. USAF, Distribution IX, controlled by IGFC. SAC units submit distribution requests through local PDO. Reader to copy ratio 9:1.

Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Price: \$14.00 per year domestic; \$17.50 if mailed to a foreign country, or \$1.20 single copy. Authority to publish this periodical automatically expires on 7 April 1982, unless its continuance is authorized by the approving authority prior to that date. Contributions are encouraged as well as comments and criticisms. Direct correspondence with the Editor is authorized. Address correspondence to Editor, COMBAT CREW, Hq. SAC IGFC, O'Hair AFB, Ne 68113.

Magazine of the Strategic Air Command - 31st Year of Publication

B52Hs deployed to Andersen AFB as part of the operation BUSY LEAGUE. After receiving training in sea surveillance, mine laying, and conventional tactical doctrine, the crew dropped live munitions at the U.S. Navy's Western Pacific bombing range

UNITED STATES AIR FORCE



ANDERSEN AIR FORCE BASE

GUAM USA

PEACE IS OUR PROFESSION



All's Not Quiet on the Western Front

Captains Byrd Stuter and Mark Whitelaw
43d Strategic Wing
Andersen AFB, Guam

High above the western Pacific, three B-52Hs carried armed MK-82 bombs toward a deserted island test range. "Amber cell, standby final countdown. Five... four... three... two... one... HACK!" While this might sound like the closing moments of a "war story" about ARC LITE or BULLET SHOT, it was really part of the newest training exercises at the 43d Strategic Wing, Andersen AFB, Guam.

Andersen's background established its credentials as the on-the-job training center for SAC contingency operations. Since reverting to its peacetime role in August 1973, members of the 43d Strategic Wing and its component, the 60th Bombardment Squadron, have demonstrated their long-standing expertise on contingency training operations. Beginning in August 1976 with "Operation Paul Bunyan", a dramatic show-of-force by B-52Ds along the

Demilitarized Zone of the Republic of Korea, the 43d has made contingency a part of its day-to-day life. Four times each week cell formations fly high altitude simulated attacks against targets in the western Pacific, the Republic of Korea, and in eastern Australia. Twice each year since 1978 the wing has participated in joint U.S.-Republic of Korea air and ground defense exercises such as TEAM SPIRIT and COPE JADE.

During exercise TEAM SPIRIT, the 43d provides bomber aircraft and crews to fly a pre-selected number of sorties in an eight day span. These sorties consist of usually two completely different mission profiles: (1) a high altitude package based entirely upon contingency procedures and (2) a low-high profile consisting of low-level nuclear training and high altitude contingency bombing. The high altitude tactics include synchronous bombing, ground directed bombing (GDB-Combat Skyspot) using the tactical air support radar team (ASRT), Wet Snow beacon tactics, and, in an emergency, interaircraft-directed runs (BONUS DEAL). The low-high package which used IR-982 as the route through South Korea consists of low level Emergency War Order (EWO) bombing runs, contingency minelaying exercises, and high altitude contingency bombing. No-notice fighter intercept activity, along with communications and electronic countermeasures jamming, is also included. Exercise COPE JADE is usually

a preliminary test of the TEAM SPIRIT profile. These exercises provide simulated interdiction strikes against "aggressor" forces on the Korean peninsula and give valuable training in contingency tactical doctrine procedures.

In September 1978, SAC initiated GIANT THRUST II, an exercise aimed at developing operations and maintenance procedures in contingency bombing and aircraft "quick turn". One hundred thirty-five sorties were flown in five and one-half days with each aircraft releasing a minimum of sixty MK-82 weapons on a remote Pacific target range. The crews of the 60th Bombardment Squadron each flew two sorties per day, having only minimum time between the four hour flights. Each flight duty day was approximately sixteen hours in length. As the crews rotated their takeoff times through the twenty-four hour day, fatigue was apparent in many faces by the third flight day. Of all one-hundred thirty-five sorties flown, only three aircraft failed to accomplish a full-load release (due to release malfunctions), yet all crossed the target as planned. The 43d Munitions Maintenance Squadron, along with temporary duty members of other maintenance units, worked long, hard hours around-the-clock uploading weapons, accomplishing pre-flights and postflights, and correcting release system malfunctions. This exercise was also a test bed for the newly-developed heavy stores adapter beams—I-beam pylons placed under

As part of their expanding role in contingency operations, B-52 crews regularly fly sea surveillance and reconnaissance missions (busy observer) against vessels such as this Desna Class Soviet AGM, the Chazma.



each aircraft wing to carry eighteen external five-hundred pound bombs.

Following GIANT THRUST II, the 43d Strategic Wing increased its role in sea surveillance missions. Tagged as BUSY OBSERVER, the B-52Ds at this lone outpost in the western Pacific began demonstrating the importance of Andersen AFB in military affairs outside the continental United States. BUSY OBSERVER missions are not only used for training in the expanding role of B-52 contingency operations, but they also provide needed data to CINCPAC on the movements of designated ships in the western Pacific.

Contingency training at the 43d came into its own with full force in December 1979 when the 28th Bombardment Wing from Ellsworth AFB, South Dakota deployed part of its B-52H force to Andersen in conjunction with its Operational Readiness Inspection. BUSY LEAGUE, as it was called, was the first time the B-52H had ever participated in large-scale contingency training, sea surveillance, and minelaying exercises. The 43d provided staff, maintenance, and instructors to accomplish all objectives of this deployment. These objectives included BUSY OBSERVER missions, Republic of Korea low-level exercises, live conventional bomb

drops, and simulated minelaying tactics.

Correlating the H's capabilities to the techniques and procedures usually applied to the B-52Ds, members of the 60th Bombardment Squadron provided continual training for this unprecedented exercise. Training Flight instructors taught SAC Contingency Aircrew Training (SCAT) procedures. These instructions included local procedures, cell formation, and evasive action tactics. The 43d SW Operations Division provided bombing and navigation information (detailed target study, high and low altitude bombing procedures, navigator specialized briefings, and radarscope tuning techniques); electronic warfare procedures (communications, electronic countermeasures data, and tape recording instructions); and defensive aerial gunner procedures (BONUL DEAL bombing, bomber defense, station keeping, and communications). Crew coordination and cell coordination were two extremely important points stressed during the SCAT school. The 43d Current Operations Branch provided high altitude BUSY OBSERVER, Korean and redeployment routes and charts; coordinated airspace reservations with foreign and domestic air route traffic control centers; gave all mission planning and pretakeoff briefings; and provided



Before flying a busy observer mission against foreign shipping, crewmembers practice photographic and maneuvering techniques with allied ships such as this frigate, the USS Bronstein, and the combat stores ship, the USS San Jose.



constant mission coordination with other base agencies. The Combat Intelligence Branch instructed the crews in both camera procedures and ship recognition features, as well as providing up-to-date intelligence information throughout the Pacific. All reporting procedures, communications guides, and contingency code words were briefed and provided by both the 43d's Command Post and the Combat Crew Communications Branch. Timely and current weather information for both the Pacific area and Stateside was provided by Detachment 2, 1st Weather Wing. Accurate forecasts and real-time data gave the crews the information needed to fly each mission successfully and safely. Crewmembers from the 60th also acted as airborne commanders and inflight instructors throughout all the deployments, especially for Korean low-level sorties and BUSY OBSERVER missions.

When the 28th was tasked by the Joint Chiefs of Staff to provide visible evidence of U.S. determination and a show of worldwide strategic power in a real-time sea surveillance environment, members of the 60th Bombardment Squadron flew as crew augmentees as well as airborne commanders to provide valuable experience and expertise. These flights greatly

enhanced SAC's resolve toward maintaining world peace.

While not degrading its own mission activity, the 43d provided further support to the 319th Bombardment Wing from Grand Forks AFB, North Dakota, the second B-52H unit to arrive. The 319th replaced the newly-qualified 28th. With the advent of Grand Forks came instructor augmentation from 1st Combat Evaluation Group, Barksdale AFB, Louisiana and the 93d Bombardment Wing, Castle AFB, California. After these personnel arrived, the 43d provided refresher training to the augmentees who then assisted in training the remaining H-model bombardment wings. This refresher training included SCAT school and inflight monitoring of the training received. Within four months of the initial deployment from Ellsworth AFB to Guam, all B-52H bases were deployed and received basic contingency training and inflight polishing of tactical doctrine skills.

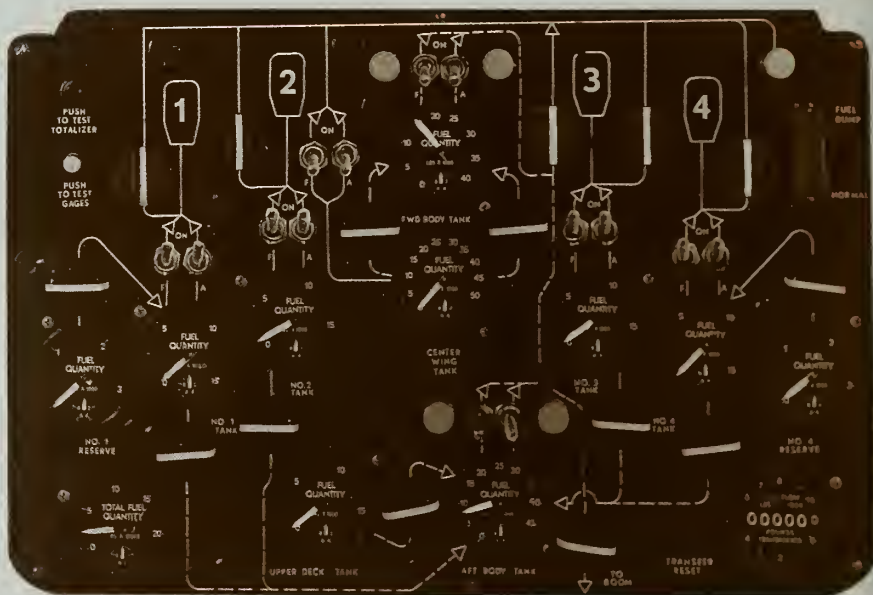
An extension of the BUSY LEAGUE deployments is the continual rotation of H-model crews and aircraft under the aegis of BUSY ISLAND. This exchange continues the contingency and BUSY OBSERVER training first taught. The BUSY ISLAND Task Force consists of instructors from various H-model bases on a

Continued on Page 18

Therein lies the value of the following article. The major damage here was to personal pride but that is a loss which can and has been repaired. We are grateful to this author, who will remain anonymous, and to those that have gone before him for writing down their personal experiences, so you may benefit from them.—Editor

Therein lies the value of the following article. The major damage here was to personal pride but that is a loss which can and has been repaired. We are grateful to this author, who will remain anonymous, and to those that have gone before him for writing down their personal experiences, so you may benefit from them.—Editor

3 ENGINE FLAMEOUT



You know it can only happen to the other guy and not to you. Well, like everyone else, I never dreamed that it could happen to me. My pride would not allow me to accept the idea that any type of error on my part would result in a situation that nearly took our lives. How could a flight that was almost a perfect mission turn into a near disaster? How could anyone take a KC-135, "the flying gas station," and flame out three engines due to fuel starvation?

The early Monday morning mission was in support of a European fighter redeployment and identical to the mission flown that previous Friday. The crew premission briefing was basically a review of the Friday mission. Engine start and taxi was normal with an extended time on the

ground awaiting launch. While on the ground we continued to feed the engines from the main wing tanks. During the initial portion of the mission, fuel in the center wing tank was burned down to 15,000 pounds and 10,000 pounds of this was drained forward for center of gravity considerations. An additional 3000 pounds were burned out of the center wing and the remaining 2000 pounds drained forward, leaving the center wing tank empty.

At level off it was noted that the aileron axis of the autopilot was inoperative, requiring hands-on flying in order to stay in position as number four in the cell. We encountered stronger than forecasted headwinds during the air refueling and off-loaded an additional 3,000 pounds to the fighters. After termination of the

refueling, I felt extremely fatigued and had the copilot fly the aircraft while I ate my inflight lunch. We had been recalculating our fuel reserve and found it to be adequate for return to the launch base. After the completion of air refueling, we had approximately 15,000 pounds of fuel in the forward body and 8,000 in the aft body tank. We began burning from the aft body and did not notice any type of low fuel state in the main wing tanks.

At the point where the fighters departed the cell on their own route we noticed an extremely low quantity of fuel in the wing tanks. During this period of time, we were extremely busy. Cell lead departed the cell with the fighters and then decided to rejoin the cell. At the same time, the new cell lead decided to put us in the lead position while the cell was climbing to a new block altitude. In the meantime, we were busy flying the aircraft while trying to trouble-shoot the wing tank fuel problem. Through our efforts, we realized that the problem was a possible air refueling manifold to engine manifold valve failure, which meant we had unusable fuel trapped in the body tanks. We were almost out of useable fuel and I made the decision to divert to a civilian airport with 10,000 feet of runway and only 30 NM away from our position. The starter switches were placed to the flight start position, the throttles pulled to idle, and the speed brakes raised. Descent was made by S-turning at the maximum placard airspeed. We arrived over the airport at approximately 5,000 feet above ground level and the engines were still at idle. The aircraft was maneuvered toward the ILS side of the field and we entered a cloud bank. As we slowed, the landing gear was lowered and the flaps were set at 30° as we approached the placard speeds. The power was pushed up for the first time as we intercepted the localizer course. Unfortunately we were too high and I elected to make a right 360° turn intercepting both the localizer and glide path simultaneously. The flaps were lowered to 50° and we began down the 4.5° glide slope with an airspeed of approximately 195 KIAS.

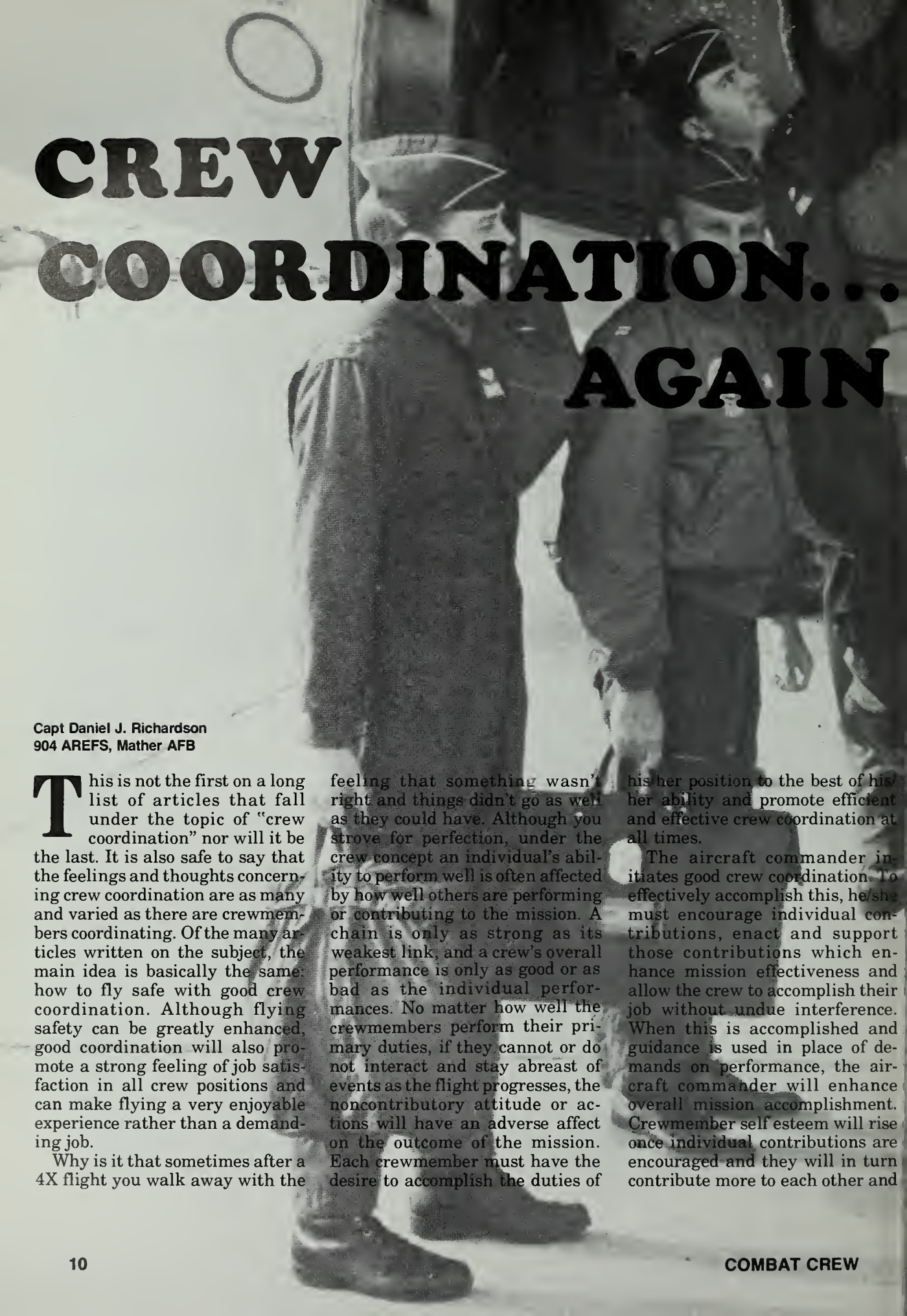
At a point where I felt the landing was assured, the power was pulled back in order to slow the aircraft closer to approach airspeed. This is when I realized something was wrong. At first I noticed the RPM on number one and two engines falling below idle speed. I pushed all four throttles forward and only number three responded. The high airspeed and the steep glide path helped in making an uneventful landing.

In looking back, it is easy to say that if we had done this or that, we could have avoided this whole terrible situation. The most obvious is that of monitoring the fuel panel. With years of trouble free operation, it is easy for the crew member to be lulled into a false sense of security. That fuel panel always works as advertised and you never hear about the valve in question failing. If we had monitored the quantity of fuel in each tank more closely, we may have noticed the problem sooner and been able to land at an Air Force base previously overflown. The Dash One states, "Immediately following a fuel panel change, closely monitor the fuel panel to determine that no undesirable fuel transfer is taking place." In the same way, one should monitor the fuel panel after a change in configuration to assure that indeed you are getting the results desired. Had we noticed the aft body tank quantity not decreasing, maybe this article would not be necessary.

Thinking back before the launch, what would have happened if we burned fuel from one of the body tanks during the extended ground operation? It's possible that we might have noticed the valve failure and this procedure would have also allowed for more fuel to be available in the wing tanks.

Instead of draining the fuel forward from the center wing tank, it would have been better to follow the fuel management sequence by burning 11,000 pounds out of the aft body tank during the initial cruise. Again, at this point in time we might have noticed the air refueling manifold to engine manifold valve failure. This procedure would also allow for more fuel in the center wing tank to be available for engine operation. By placing additional fuel in the body tanks you are only asking for trouble if the valve in question were to fail. I now strongly believe it is much better to retain most of the fuel needed for flight in the wing and center wing tanks. It is so much easier having to drain the fuel necessary for the offload rather than taking the chance of trapping a large amount of fuel where you may not be able to use it.

In our case, we failed to monitor the fuel panel adequately. Complacency is a subtle beast who can sneak up and bite you when you least expect it. I hope this article will make some people think and maybe save them from a similar situation. With the extreme cutbacks in flying time, we must remember that our experience level is not as good as it should be. We must be on top of it all of the time and do everything possible to avoid complacency.



CREW COORDINATION... AGAIN

Capt Daniel J. Richardson
904 AREFS, Mather AFB

This is not the first on a long list of articles that fall under the topic of "crew coordination" nor will it be the last. It is also safe to say that the feelings and thoughts concerning crew coordination are as many and varied as there are crewmembers coordinating. Of the many articles written on the subject, the main idea is basically the same: how to fly safe with good crew coordination. Although flying safety can be greatly enhanced, good coordination will also promote a strong feeling of job satisfaction in all crew positions and can make flying a very enjoyable experience rather than a demanding job.

Why is it that sometimes after a 4X flight you walk away with the

feeling that something wasn't right and things didn't go as well as they could have. Although you strove for perfection, under the crew concept an individual's ability to perform well is often affected by how well others are performing or contributing to the mission. A chain is only as strong as its weakest link, and a crew's overall performance is only as good or as bad as the individual performances. No matter how well the crewmembers perform their primary duties, if they cannot or do not interact and stay abreast of events as the flight progresses, the noncontributory attitude or actions will have an adverse affect on the outcome of the mission. Each crewmember must have the desire to accomplish the duties of

his/her position to the best of his/her ability and promote efficient and effective crew coordination at all times.

The aircraft commander initiates good crew coordination. To effectively accomplish this, he/she must encourage individual contributions, enact and support those contributions which enhance mission effectiveness and allow the crew to accomplish their job without undue interference. When this is accomplished and guidance is used in place of demands on performance, the aircraft commander will enhance overall mission accomplishment. Crewmember self esteem will rise once individual contributions are encouraged and they will in turn contribute more to each other and



improve their individual performances. The overall result will be improved mission effectiveness and increased safety awareness.

Although the aircraft commander is responsible for good crew coordination, the other crewmembers are the ones that "make it happen." Knowing what others are doing and helping them out whenever possible creates a feeling of unity and a sense that everyone is working toward the same goal. The philosophy that "I" have to fly the nav leg or "I" have to score the nav leg or that "I" have to complete the refueling will always lead to a mediocre, so-so flight. If "we" accomplish all the required tasks in order to complete the mission, the crew will have worked as a cohesive unit and will

invariably experience a much safer, more enjoyable, productive flight.

To be able to coordinate effectively, you must not only know what your fellow crewmembers do, but more importantly, you must know what assistance each of the other crew positions requires and wants. Learn as much as you can about the other specialties on the crew. No, don't try to do their job for them. Too many times we try to "force" our coordination on the other crewmembers because that was the way it was done at Base X or on Crew Y. Establish among the crew precisely what is needed and more importantly what help is "helpful."

Good crew coordination starts with mission planning; it doesn't

magically appear when the wheels rise above the concrete. Coordinate your mission planning tasks; don't accomplish them in a vacuum. The time to plan your crew coordination is during your mission briefing. Take the few extra minutes required to establish or reaffirm those individual responsibilities and desired crew interactions that will contribute to good crew coordination.

Good crew coordination involves both communication and interaction; helping and allowing others to do their job. Next flight, don't hassle your fellow crewmembers, work together and see if overall crew performance doesn't increase with an even greater increase in the enjoyment of flying.



TSgt Dave Wimmer
416 BMW
Griffiss AFB

The best way to become proficient at any task is to stick to the basics and follow established procedures. If you perform a task in exactly the same manner time after time, it stands to reason your level of proficiency will increase along with your understanding of the task you are performing. Troubles arise when we deviate from established procedures, and such deviations can lead to confusion and uncertainty.

What do these deviations have to do with communications as far as boom operators are concerned? During air refueling operations the boom operator is the focal point for communications between the tanker crew and the receiver aircraft. Using established communication procedures during this phase of flight becomes extremely important, not only to the rest of your crew but to the receiver aircraft as well. During refueling operations you become the "eyes" of the tanker aircraft as you are the only crewmember who has visual contact with the receiver. It is your responsibility to keep the tanker pilot informed of the receiver's position and closure rate.

BOOM OPERATOR COMMUNICATION

The NOTE on page 4-21 of T.O. 1-1C-1-3 explains your responsibilities. The pilot has a rough idea of the receivers position, but only you can furnish the exact information he requires. Clock position tells the pilot a little about the receivers position, but a call of "7:30, Low, 2 miles" tells him exactly where the receiver is.

Another trap we can easily fall into is the $\frac{1}{2}$ NM radio check. How often have you heard "Boom, you're cleared to Command" and the only response was "Roger"? Once again, the -3 is explicit. The proper terminology is "GOING TO COMMAND", after the receiver pilot calls $\frac{1}{2}$ NM. Simple, yes, but it can easily be screwed up.

When the receiver slides into the precontact position and calls "STABILIZED, PRECONTACT", we respond with "22 YOU ARE CLEARED TO THE CONTACT POSITION, 56 IS READY". The receiver should then acknowledge your transmission with "22 IS READY". After the fuel is transferred, the receiver should call "22 DISCONNECT NOW". The boom operator will then trigger a disconnect, visually confirm the nozzle has cleared the receptacle, and

acknowledge "56 DISCONNECT". Seems simple, right? But again it sometimes gets screwed up.

The receiver has his offload now and is dropping down to the bottom of the block. Does our responsibility for keeping our pilot informed end here? The answer is an emphatic NO! The -3 spells it out in black and white. The boom operator will not close the sighting door until the tanker or receiver has cleared the AR track. If you have planned a practice emergency separation at the end of AR or if you were forced to call an actual breakaway, there is an established procedure for this maneuver. The procedure is the same for a practice separation as it is for an actual separation; It is "TANKER CALL SIGN, BREAKAWAY, BREAKAWAY, BREAKAWAY". Remember that a practice separation requires *THREE WAY COORDINATION* between the tanker pilots, the receiver pilots, and the boom operator. This coordination must include, who will call it, when it will be called, and from what position (contact, precontact, etc) it will be initiated. Remember, a breakaway may be called by any

crewmember on either aircraft. After initiating the breakaway the receiver is well clear of your aircraft, your next call should be "PILOT, CLEARED TO CLIMB". Make sure your pilot is clear to climb before you make the call. This maneuver also calls for flashing the pilot director lights so don't let the "Dumb Thumb" grab you.

The next time you're on alert, why not break out the -3 and read through the section on communications. You may run across some things you haven't thought about in a while. Who knows, it may make the difference between a "Q" and a "H".

I realize this article may seem redundant to the high time troops and very basic to the rest, but no boomers in the squadron are always flawless. Learning and improving our performance is an endless process for all of us. No one person knows everything, but together I think we come pretty darn close to it. We are a winning team and the way to keep on winning is for all of us to work together and strive to be the best possible boom operators we are physically and mentally capable of being.



r&d corner

LIFE SUPPORT SYSTEMS ACQUISITION

Cal Crochet
HQ SAC/XPHV

The Air Vehicle Division is responsible for the overall management of conception, development, test and evaluation and procurement of new or improved life support/chemical warfare protection equipment and aircraft/missile environmental protection subsystems. As such, direct liaison is maintained with various DOD agencies and industrial life support-related organizations. Since development efforts within this area encompass many varied programs, this article will highlight some of the endeavors benefiting the SAC mission. These programs include:

THERMAL FLASH BLINDNESS

This program is rapidly approaching operational reality with aircraft and aircrew helmet modification verifications completed and distribution of modification kits and goggles underway. The success of this development program can be attributed to the innovation of a transparent electro-optical ceramic wafer called PLZT (from the chemical symbols for lead, lanthanum, zirconium, titanate). This PLZT material, when placed between two crossed polarizers and connected to a 28VDC power source, rotates the linearly polarized light that is transmitted through the first polarizer so that

it passes through the second polarizer. The system contains photo-electric sensors that, upon detecting a nuclear flash, reduce the voltage within microseconds, causing the system to change to an opaque or protective state of operation. As the light intensity of the flash gradually diminishes, the voltage will automatically increase so the light transmitted through the system is restored to the level which existed prior to the flash. Since the crewmember's vision is never completely blocked, he will always retain some external visual capability to allow for continued performance of flight duties. This development program has produced a helmet-mounted goggle (EEU-2/P) for bomber/tanker SIOP application with a nonhelmeted goggle (EDU-2/P) under development for E-4, KC-10 and KC-135 (BO only) operations. Once these goggles are operational and you have had the opportunity to observe their operation, you will agree this development effort offers a quantum technological advancement over the equipment currently in use today.

IN-FLIGHT OXYGEN GENERATING SYSTEMS

Increased physiological demands on aircrew members and advancements in space flight technology and electrochemical science have

led to the conception and development of in-flight oxygen generation systems for aircraft application. Although several methods of extracting oxygen from ambient and/or aircraft engine bleed air sources have been investigated, only two concepts have been successfully developed and are currently undergoing operational flight testing. These two concepts include an open loop system and an oxygen enrichment system and are described as follows:

1. Open Loop Oxygen Generating System (OLOGS). This system functions on a reversible chemisorption (absorb/desorb) concept using dual Fluomine (a cobalt chelate sorbent chemical) beds that operate on a pressure/temperature swing principle. Basically, these beds function in a cyclic manner, whereby, as one bed absorbs oxygen from the air source, the other bed "desorbs" (gives off) its extracted oxygen. This extracted oxygen (100% purity) is then compressed and supplied to the aircrew for consumption and/or stored in an accumulator for later use. The system is fully automatic and capable of producing enough oxygen for six crewmembers.

2. Oxygen Enrichment Generating System (OEGS). Although the OEGS theory of operation is similar to that of OLOGS, its oxygen-producing concept is different. This system functions using a molecular adsorption concept and operates on a cyclic pressure principle using dual molecular sieve adsorption beds comprised of crystalline alumino-silicate zeolite material. Basically, the adsorption process works through molecular separation (size/polarity). Since the pores of this material are uniform in molecular size and dimensions, only oxygen-size molecular particles will pass through these pores. As the chemical composition and molecular size of both oxygen and argon gases are similar, they both pass through the pores, leaving mostly nitrogen to be vented overboard during the pressure swing cycle. The resulting gas is a breathing mixture comprised of 95% oxygen (maximum) with the balance being argon. Studies by the USAF School of Aviation Medicine have concluded that this gas composition is safe for aircrew use.

Both the OLOGS and OEGS development programs have completed qualification testing and are currently in operational testing. The OLOGS program is under USAF management with testing being conducted on the B-1, and after two years of testing and over fifty flight test missions performance of OLOGS has been excellent. The OEGS program is primarily Navy sponsored and is in the final stages of testing on the AV-8A Harrier. Preliminary test

results also indicate excellent performance, and fleet-wide installation of this system has been recommended. In addition, OEGS test analysis and aircraft modification requirements are under study for possible FB-111 test and future operational utilization. Increased system safety, elimination of liquid oxygen production, deletion of pre-mission aircraft servicing requirements, unrestricted aircraft dispersal basing and unlimited oxygen usage are all attractive merits of these self-generating oxygen systems.

CHEMICAL WARFARE DEFENSE

Intelligence reports and recent world events have shown a need to provide protection for our forces deployed within or designated for contingency deployment to geographical regions considered to be possible chemical warfare high threat areas. Therefore, a program to equip designated bomber, tanker, reconnaissance and ground support personnel with near-term chemical warfare defence (CWD) ensembles was initiated. In late 1978, we conducted a compatibility evaluation of this near-term equipment at Dyess AFB, Texas, in B-52D and KC-135 aircraft using current contingency tactics and aircraft support procedures, modified with CWD operational concepts and procedures. This evaluation validated SAC's CWD concepts of employment and verified that B-52/KC-135 contingency operations could be accomplished with this equipment. However, this evaluation also confirmed numerous deficiencies and operational limitations previously identified during a similar TAC evaluation. As a result, follow-on development efforts are underway to correct inadequacies and to provide improved protection, detection, and decontamination CWD equipment, including medical treatment. Some of these endeavors include eye and respiratory protective headgear, cooler ensemble material, enhanced foot and hand protection, automatic area detection and alarm notification systems, and decontamination equipment capable of supporting aircraft and ground support vehicles/equipment as well as air base runways and ramps. Additionally, work is progressing in aircraft environmental control systems to give these systems the capability to purge pre-mission contaminated cockpits and prevent in-flight contamination. Such a protective capability would greatly enhance large aircraft deployments to and from chemical warfare threat areas. SAC is actively working with other major commands in all CWD development and testing programs including optimizing employment concepts and procedures. Through these efforts, follow-on development programs will produce

Continued on Page 30

Maj John W. Hallgren
19th Bomb Wing
Robins AFB

Don't Let

Pretend the next major aircraft mishap is going to happen to you. For some reason, the old fickle finger of fate is going to point in your direction — maybe not your next flight, maybe not even next month, but the next mishap whenever it happens, will have your name on it. Now ask yourself the question: "Why will it happen?"

There may be a lot of reasons: you're flying an aging aircraft; the hours keep piling up; parts are scarce; fatigue and age have long since begun to show on our fleet of aerospace vehicles. They're also getting harder to repair and the ability to repair them is being eroded. The aforementioned lack of parts, coupled with the exodus of trained maintenance personnel means the aircraft you fly is going to have more repeat writeups, more trouble getting off the ground and more problems while you're airborne. Not only that, you've got a lot fewer flying hours to practice your skills and hone your crew coordination. In fact, you've barely got enough time to knock off the rust that accumulated from the last flight.

CEVG trends don't look very bright either. There are more "busts" for in-flight procedures than before. The fewer flying hours mean less experience for the new guys. For the old heads returning to the cockpit, that means fewer hours to refresh those faded memories on how to master instrument approaches, air refueling, bomb aiming, low level, etc.

I know you are aware of all these factors, but do you really think about how they might affect you if applied collectively? I sure hope so. Mishaps within the last year have included old cause factors: switches improperly positioned, checklist deviations, not flying the aircraft, etc. These factors are un-

acceptable at any time but now combine them with an aircraft emergency and you can really get behind the power curve.

Every airframe we lose compounds the problem. If we lose a B-52, Boeing isn't going to crank up the production line to make us a new one, even if we could scratch up the coins somewhere. It means the remaining aircraft are going to fly a few extra hours, age a little faster, deteriorate a little more and break a little more often. It means one less frame to train with and one less plane to deter with. Pretty bleak picture, right?

There are also a number of things we can't change immediately. The age experience of the crew force isn't going to change overnight and the monetary constraints are bound to get worse before they get better. Maintenance might get better as our wrench-

bender brothers become more experienced, but we can't count on that right now.

What can we do about it? Make the most of the flying hours we get. Since fewer hours are spent in the air, ground fly the mission to be sure you will receive the maximum training out of the hours you do have. Are you working on the things you're weak on, or just practicing ILS's because you're good at them? Instead of deadheading back from a navigation leg, practice an emergency procedure for crew coordination. It just might save your life some day.

After your flight, do a thorough postflight. Help those maintenance guys out. They want to fix it and if you don't believe that, spend a day in the maintenance complex watching them scramble to give operations the airframes to fly. Troubleshoot as accurately and



The Next One Be Yours



completely as possible in the air, and make your 781 writeups understandable. In other words, let maintenance know what really happened. After maintenance debriefing have an informal critique with the crew to help improve that all important crew coordination. Find out who's having problems and resolve the problems as a group; get the whole crew involved. The flight may have been long and you're anxious to get home but don't delay in taking care of any problem which might have surfaced. Relax, grab a cold one, and start preventing the accident with your name on it.

If you're the aircraft commander, you've got a greater responsibility than it may appear. You have the responsibility of insuring everyone accomplishes his or her part of the mission in accordance with all those manuals, regula-

tions, directives, rules, etc. You also insure everything fits and everyone is getting the maximum out of whatever flying hours you do get. As a crew member, if you fly unprepared, or do not have the proper attitude toward improving your productivity, the flying you accomplish will become less and less fruitful. If you aren't contributing something positive, you're compounding the problem.

All the ground preparation (publications up to date, EP's studied for, complete mission planning,) will pay off if and when things start to deteriorate. When you've already planned for those unexpected contingencies, i.e., loss of radar, receiver no-show, unable to go low, etc., it sure makes it easier to be able to immediately cope with the situation, rather than delaying action to think it over in the air. At approx-

imately \$6,000 per hour to fly a B-52G around, one minute equals about \$100. If you're not receiving training or being productive as those minutes go by, it's like taking a wad of \$100 dollar bills and slipping them one by one out the sextant port.

Keeping the above in mind will also help protect the most valuable asset in the Air Force inventory — YOU. The reduced flying hours, older airplanes, lack of parts, inexperienced maintenance personnel — all of these won't get better in the near future. Take pride in preparing for each flight to obtain the most training you and your crew can receive out of each flying hour allotted to you. Keep yourselves ready, protect our aerospace machines and take an active part now. Prepare to prevent that mishap which may be just around the corner.

WESTERN FRONT

Continued from Page 7

45-60 day temporary duty assignment. These personnel provide the backbone of all mission and flight planning as well as sustained inflight instruction.

Another on-going project is BUSY ADVENTURER. This exercise prepares Stateside crews for global operations on a continuing basis. These missions are designed to provide crew training and diversification that is not normally available. Normal scenarios include a two-ship launch from a Stateside base, overwater navigation and aerial refueling, low-level navigation and bombing in the Republic of Korea, and a recovery at Andersen AFB. This scenario has only been flown by the 28th Bombardment Wing in August 1979, but 8th AF units are scheduled in the future. This mission provided the impetus for all the follow-on BUSY LEAGUE deployments. Such training is invaluable to SAC and its crewmembers in their strive for perfection in both EWO and contingency strategy and tactics.

The Western Pacific story would not be complete without applauding the outstanding refueling support provided by the 376 SW at Kadena AB, Japan and the Pacific Tanker Task Force (PTTF) here at Andersen. The PTTF is a contingent of highly-qualified individuals which work only with temporary duty KC-135 crews in all its operations; there are no permanent refueling tanker aircraft or crews stationed on Andersen. Highlighted by the BUSY LEAGUE deployments were the rapid response and the inherent flexibility capabilities of the PTTF. Not only were they tasked with all 43d daily training and Higher Headquarters directed missions, but they also had to provide refueling support for some BUSY LEAGUE inbound bombers, BUSY OBSERVER missions, and the continuing tactical fighter exchanges between Pacific bases and the States. The PTTF contributed to and is involved in the following special exercises: *COPE THUNDER*, a joint-force exercise in the Republic of the Philippines; *TEAM SPIRIT*, the 43d's joint-force exercise in the Republic of Korea; the Operational Readiness Inspection; and *CORONET WEST*, F-4/F-15 exchanges. Without the untiring and continual dedication and effort of the PTTF and the 376 SW at Kadena AB, Japan, the 43d, SAC, and PACAF could never have accomplished their assigned missions.

As the western front of SAC B-52 units, all is not quiet on this tropical island in the Pacific.

Strategic Air Command B-52D bombers carried MK-82 500-pound bombs both in the bomb bay and under the wings during the GIANT THRUST II exercise, Sept. 11-15. The bombs are dropped over the U.S. Navy's Western Pacific bombing range as part of the aircrew training accomplished during the exercise.



As Major General Louis C. Buckman, SAC DCS/OPS and former commander of Third Air Division, stated:

"World realities demand an expansion of the contingency capabilities and strategic presence in the Western Pacific and Indian Ocean. Here is where concepts are turned into reality. It's taken a lot of hard work by everyone involved, but the exercises are working, the crews are getting the training they need, and the support elements are rounding out their expertise. I am proud that the units of Third Air Division are on the cutting edge. The Western Pacific—it's where the action is!"

So the next time you hear a "war story", it just may well be a tale of the missions being flown from Andersen AFB today.

"Amber cell, complete... no contact... RTB!"

WHAT THE GENERAL REALLY MEANT

Continued from Page 3

airspeed indicator it read and he announced "90 knots-Now." The aircraft was accelerating so rapidly there was no doubt in anyone's mind that it would reach takeoff speed without impediment. However, "the book" still requires the 70 knot call and the check. The alternative to taking off without the check is to abort the takeoff. Only a fool would have attempted to stop a heavy, rapidly accelerating B-52 on a slick runway, and only a fool would have seriously suggested that. Now the "old guard" were not fools—they busted the pilot for missing the check, but they refrained from suggesting the pilot should have attempted to abort the takeoff. The wing commander at Base X challenged them by asking which course of action the pilot should have taken under the circumstances. They responded that the pilot was unqualified for missing the 70 knot call and that was that. Period.

All of these cases illustrate how a good idea (preventing bad or completely unpredictable behaviors) can go amuck and become a bad thing (also preventing good behaviors or novel behaviors required by novel circumstances). Instead of accepting that regulations only proscribe *some* of a nearly infinite range of bad behaviors, many of us have come to believe one—or, heaven forbid, both—of two cardinal fallacies: that anything not specifically forbidden is always allowed, or that all behavior is governed by one regulation or another. Such is just not the case.

The most important thing, as General LeMay said, is knowing the correct thing to do. In coping with those small workaday problems the regulations will rarely steer you wrong and will usually prevent you from making a bad thing worse. However, you must keep it in mind that *all* the correct things to do are not recorded anywhere. This is especially true when catastrophe strikes. Even the book of books, the Dash One, states: "This manual provides the best possible operating instructions under most circumstances, but it is a poor substitute for sound judgment. Multiple emergencies, adverse weather, terrain, etc., may require modification of the procedures." Not only do those sentences mandate that the correct thing be done, they are also the charter to "modify procedures" when the correct thing appears to be in opposition to the prescribed procedure. This will always work

safely if you are so familiar with the objective and the activities and equipment required to support it, that the correct thing leaps out at you screaming to be done.

No one is ever in a better position to know the "correct thing" than the person who lives and works with a weapon system. Yet, and this is most unfortunate, the *real* experts are frequently mute or disbelieving of their expertise. Mute, in that they fail to take advantage of the multiple channels available to share knowledge: the suggestion program; hazard reporting; tech order change proposals; face to face advocacy with peers and superiors; et cetera and et cetera. Some experts are mute because they don't believe they're really experts. They wrongly believe that the real wizards are somewhere else, some Oz-like higher headquarters. Folks are assigned to headquarters because they had the "right stuff" and knew the "correct thing" when they were at the wing. But their knowledge is fragile and diminishes with time and lack of daily exercise. *You* are the experts now and are obligated to know and preach the correct things. *You* are the only ones who can make regulations substitute correct behaviors for random and incorrect ones.

General LeMay's dictum wouldn't mean much to us if we weren't a combat outfit. Our training and outstanding aircraft and missile maintenance teams normally protect us from catastrophe. However, ours *is* a combat outfit and a deadly serious business. Should hostilities commence, it will fall on our shoulders to meet the objectives set for us. Since every LCF and LCC is a target and every bomber will take the war into the heavily-defended enemy homeland, every one of us must be prepared for the multiple emergencies which arise when people shoot at you and hit you. Those sweat-inducing system failures we normally encounter only in the simulator will then be our real-life lot, and we had better know the correct things to do. If we can't get those weapons on our targets (always *the* Correct Thing) there's no one else who will do it for us.

Knowing the correct thing and doing it is no small task. There may be organizational and personal hurdles to overcome. The regulations are a safe but incomplete starting point. Start there, but progress to the correct thing. Our business demands it.

WIND SHEAR

don't get caught behind the power curve . . .

Lt John C. Hildebrand
Stan/Eval Division
Andersen AFB

There's little doubt what wind shear is, and the dangers involved when you encounter it at low altitudes. The greatest problem facing the crew member is timely recognition of the problem and making the proper responses before the situation gets out of hand. While many solutions are being tried and tested, no foolproof method of detection has been found. There is however, one method we can use in the B-52 and the KC-135 which will help provide the crew with more timely information. It can be called the "minimum ground speed method". The basic principle is to determine a minimum ground speed that should be maintained on final, then comparing that with your indicated airspeed and actual ground speed, fly the speed which more correctly determines what the surrounding air mass is doing.

To understand why this method will work you first have to understand what happens to the aircraft speed as it encounters a wind shear. As the aircraft moves through a static body of air it will maintain a given IAS and ground speed. If this static body of air is suddenly changed into a headwind, the IAS and ground speed will react in opposite directions. The IAS will increase due to the increased ram pressure on the pitot tubes while the ground speed will decrease due to the increased headwind. The pilot's initial reaction to the increased IAS will be to reduce power in order to slow the aircraft to the target IAS. The amount of power reduction will depend on the size of the headwind and in some cases idle power may not be sufficient to reach the target airspeed. As the aircraft passes through the shear line, the headwind will rapidly become a tailwind and the increase

in IAS which accompanied the headwind will be lost. Now the aircraft is well below target IAS with the IAS dropping still further and the engines at or near idle thrust in a low RPM condition. In other words, **BEHIND THE POWER CURVE!**

One method to avoid this problem is to use the navigator's Doppler (or INS) ground speed to help recognize the wind shear. If you are in an area where wind shears are forecast or have been reported, be alert for a rapid and sizable increase in IAS with an

accompanying decrease in ground speed. This is a good indication that you are encountering a wind shear. When the Nav informs you the ground speed is below the predetermined minimum, increase the power to maintain your GROUND SPEED, momentarily disregarding the IAS. The prime concern at this time is to keep the power up and the ground speed at its minimum acceptable value. When we pass through the shear line, the IAS will start to fall toward the target airspeed. With the higher engine speed, we're in a better position to go around if the IAS continues to fall and the sink rate increases. Staying ahead of the power curve is the name of the game. What happens if we don't pass through the shear line and we cross the threshold at the high IAS. When we reduce the power we will get a faster than normal decrease in flying speed due to the headwind. In addition, our float will be minimized and although we have a higher IAS, our ground speed will not be proportionately higher because of the headwind. This will mean little or no change in the ground roll and if worse comes to worse, we're still in a good position to go-around. It's a lot easier to explain a go-around than it is to explain "landing" a mile short of the runway.

The last thing we should consider is how to compute our minimum ground speed. First, we compute the final approach speed. We then convert it to true airspeed (TAS) and subtract the headwind component. On a day with an outside air temperature of 40°C and a pressure altitude of 2,000 feet, a final approach speed of 140 KIAS will have a TAS of about 145 knots. If the computed headwind is 10 knots then our minimum ground speed will be 135 knots. In gusty wind conditions you can use 50% of the gust factor or, if you really want to play it safe, don't subtract the gust factor at all and stay with the higher minimum ground speed.

When should you use this technique? It might not be a bad idea to compute minimum ground speeds for all your landings. The navigator could add this to his best flare computations. In any event, minimum ground speed will come in handy anytime wind shears are reported in the area. It takes only a few seconds to compute, but if a shear is encountered, those few seconds can save a lifetime.

Life Support Airmen of the Year

NCO



MSGT REX R. ROBNETT, 319 Bombardment Wing Aircrew Life Support Branch, is the SAC Life Support NCO of the Year. In a brief ceremony at Grand Forks Air Force Base, November 5th, Colonel Wayne O. Jefferson, 319 BMW Commander, presented the plaque recognizing MSgt Robnett's outstanding achievement.



AIRMAN

A1C ROBERT GILLESPIE, 93 Bombardment Wing Aircrew Life Support Branch, is the SAC Life Support Airman of the Year. In a brief ceremony at Castle Air Force Base, November 14th, Colonel Leo W. Smith II, 93 BMW commander, presented the plaque recognizing Gillespie's outstanding achievement.



THOSE INTERRELATED AERODYNAMIC EFFECTS

ATTENTION: TANKER PILOTS, RECEIVER PILOTS, &
BOOM OPERATORS

Major Hugh E. Smith
Central Flight Instructor Course
Castle AFB, CA 95342

Those of us who periodically pass gas in-flight have all been told that "it is unsafe to fly two aircraft in close vertical proximity because of the magnitude of interrelated aerodynamic effects". Well, that's neat to know, but some further discussion might also be neat. The above warning can't help but elicit more questions. Such as, "What effects?" and "How much magnitude?" Well, let's look at what happens to the airflow around two aircraft during air refueling, and then look at what these "interrelated effects" mean to us as pilots. Then we'll look at some all too common situations.

UPWASH, DOWNWASH, BERNOULLI

To understand what's happening during air refueling we need to understand a little about upwash, downwash, tip vortices, and some of old Hormel Bernoulli's theory about pressure differentials. As an aircraft produces lift it affects the airflow around it. Relatively speaking, the airflow produces an upwash ahead of the aircraft and a significant downwash behind it.

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Remember last summer when you were whistling down the highway toward your favorite bistrotro and you noticed a butterfly about to become a hood ornament on your car? You were concerned momentarily about your fresh wax job, but that young butterfly was mysteriously lifted over your car. If you had looked in your rearview mirror you would have noticed said butterfly, on the outer edges of maneuvering flight, as he was suddenly returned to his original altitude. What caused this phenomenon? Your car was actually acting as an airfoil. The airflow directly in front of your car was directed upwards and back creating upwash. Additionally as the airflow passed over the rear of the car downwash returned the butterfly to his original altitude. When a wing produces lift, we all know that a pressure differential exists between the upper and lower surfaces. At the wing tip this pressure differential creates components of spanwise air flow. On most SAC aircraft the

lateral flow developed at the tip is quite strong and a rather strong vortex is created. For conditions of positive lift, this vortex has a twisting component toward the aircraft centerline as it moves relatively down and aft of the wing. According to Bernoulli the above mentioned pressure differential is due to the velocity differential above and below the wing. By now you're thinking "all this is really fine but how does it affect air refueling?"

NORMAL CLOSURE

Consider first the normal air refueling closure from precontact to contact. We all know what happens to our airplanes, but why does it happen. Ask any tanker driver why his airplane is affected and he will tell you "Receiver bow-wave (upwash)", and he is right! Partially. Ask any receiver pilot why his airplane is affected and he will tell you "Tanker down wash". He is also right, partially. Some of you "Christine" 135 drivers who are AC/DC may be feeling left out, but you folks probably have the *most* correct answer . . . "It depends". Actually, as two aircraft come in close vertical proximity, the upwash, downwash, and to a lesser extent the tip vortices of both airplanes are affected. From the tanker view point, a receiver closing to the contact position causes a change in the vertical component of the upwash and downwash which is not unlike ground effect. The tanker wants to pitch down as it does when entering ground

effect (nose-up trim is required.) Induced angle of attack is reduced just as it is in ground effect (thrust required is reduced). In fact it has been shown that in some conditions of flight (climb for example) the increased parasite drag of boom extension is more than compensated for by the reduction in induced drag due to the receiver in contact, causing "ground effect".

From the receiver point of view, tanker downwash causes the airplane to want to pitch down and slow its rate of closure. The magnitude of these effects depends primarily on the rate of change of the upwash and downwash on both airplanes. This rate of change depends on the speed and relative angle that the receiver takes. The receiver closing very rapidly will obviously have a more rapid and dynamic affect on the tanker. The receiver who closes very low and then tries to pop up to contact, as well as the pilot who tries to close very high and level, causes a more rapid and dynamic change on the tanker because the receiver bow wave (upwash) and tanker downwash are entered suddenly rather than gradually. Slow closure turns out to be a very wise technique. As the receiver achieves contact he notices that the pitching moment caused by tanker downwash has dissipated considerably. If the receiver should continue on beneath the tanker he will notice the pitching moment begin to increase again, only this time in the *NOSE UP* direction!

CENTERLINE UNDER RUN

If the receiver continues to underrun the tanker, the downwash will move aft causing the receiver to begin to *pitch up*. If the underrun condition develops to the point where the downwash strikes the empennage, elevator authority may be insufficient to counteract the pitch up. Pitch up by the receiver is but one of the characteristics of a centerline underrun. Additionally, the tanker begins to exhibit more and more of a pitch down tendency, (similar to ground effect.) Wonder why? As the airflow accelerates between the two aircraft. (Venturi said it would), the pressure in this area will decrease (remember Bernoulli?). This low pressure will attract both aircraft (increased lift on the underrunning receiver, decreased on the tanker above). If the tanker autopilot is engaged, it may sense this low pressure as a climb and induce even more nose down pitch. B-52 pilots should remember that lowering the landing gear can be an exceptionally fine idea when a center line under run appears eminent.

LATERAL UNDER RUN

Let's consider next what would happen if the receiver noticed a center line under run developing and attempted to offset himself to one side. If a turn is attempted too late, say after the receiver enters the area of tanker down wash, it will be very difficult to affect a turn at all. If the receiver has one wing affected by downwash and the other not, the receiver aircraft will want to roll toward the tanker centerline. You can feel these pressures by attempting to line up on an outboard engine during your next refueling.

If the closure angle and rate are of sufficient magnitude to allow a lateral underrun, the same principles apply as during the center line underrun. The overlapping wings cause airflow to accelerate (Venturi again), the increased air velocity causes a decrease in pressure (Yep, old Bernoulli). Low pressure between the two wings will cause them to attract, resulting in a tendency of the tanker to roll toward the receiver, and the receiver to roll away from the tanker (Tanker affected wing will drop, receiver affected wing will rise). The result can be just as dramatic as a center line underrun.

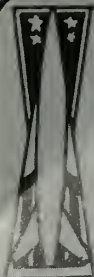
BREAK AWAY

A properly executed break away (anybody can initiate one) is a good remedy for conditions leading to the above situations. However, an improperly executed break away may serve only to compound the problem. Remember, separation is the objective! Tank drivers, don't be in a big hurry to increase your pitch attitude, increased pitch can lower your tail and decay airspeed. Receiver drivers, don't be in a big hurry to stuff the nose over. Your tail can come up, and even with the power at idle, airspeed can increase. Booms, make sure your "Cleared to climb" call is not automatic, and if the old Ace climbs early you might tactfully place both quick-dons on his name tag while you explain the situation.

Although it is really not that important to know that Venturi and Bernoulli developed these theories, an understanding of the principles involved can help us to recognize a potentially hazardous situation soon enough to recover. An understanding of these principles can also help us to visualize what Fred Boeing is talking about when he tells us that "it is unsafe to fly two aircraft in close vertical proximity because of the magnitude of interrelated aerodynamic effects".

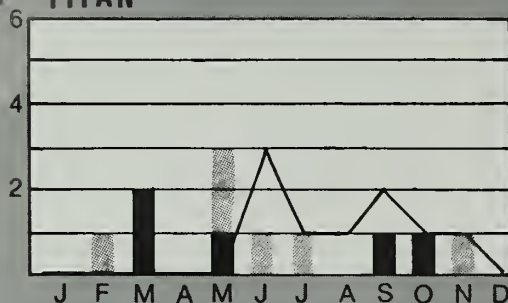
Until next month "Fly the aircraft".

1980

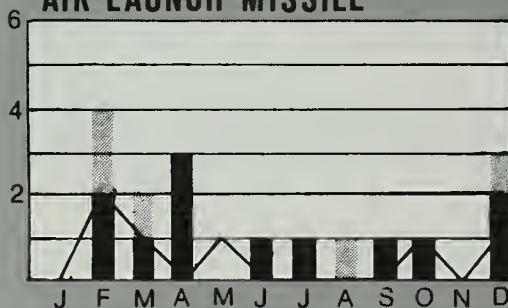


Space & Missile Mishap Experience

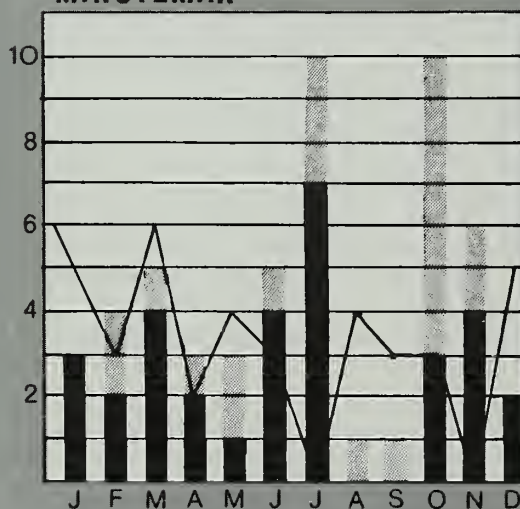
TITAN



AIR LAUNCH MISSILE



MINUTEMAN



PERSONNEL
ERROR

NON PERSONNEL
ERROR

TOTAL MISHAPS
1979

TECH DATA VIOLATION

During a missile guidance set (MGS) recycle the leg assembly of the workcage became entangled with the liquid spring pressure monitor (W955) cable. It was not severed but had been stretched and separated from other cables. Damage to the monitoring system was indicated. A technical order procedure for taping the W955 cable with stiffer cables to prevent entanglement was not accomplished. Recommendations from previous like mishaps do little to prevent future mishaps if not followed.

TECH DATA VIOLATION

A closure nozzle separated from a SRAM rocket motor when a maintenance technician was charging the system with nitrogen. The technician experienced lacerations to the left hand and broken bones at the tip of the thumb and three adjacent fingers. Damage was limited to a valve adapter and rocket motor nozzle. The cause of this mishap was multiple violations of technical data. The technicians attached a high pressure line to the rocket motor in place of a low pressure line. Portions of the nozzle adapter were not used and the technicians failed to purge the nitrogen system prior to connection to the rocket motor. Strict adherence to technical data and *adequate supervision* were lacking when this operation was conducted.

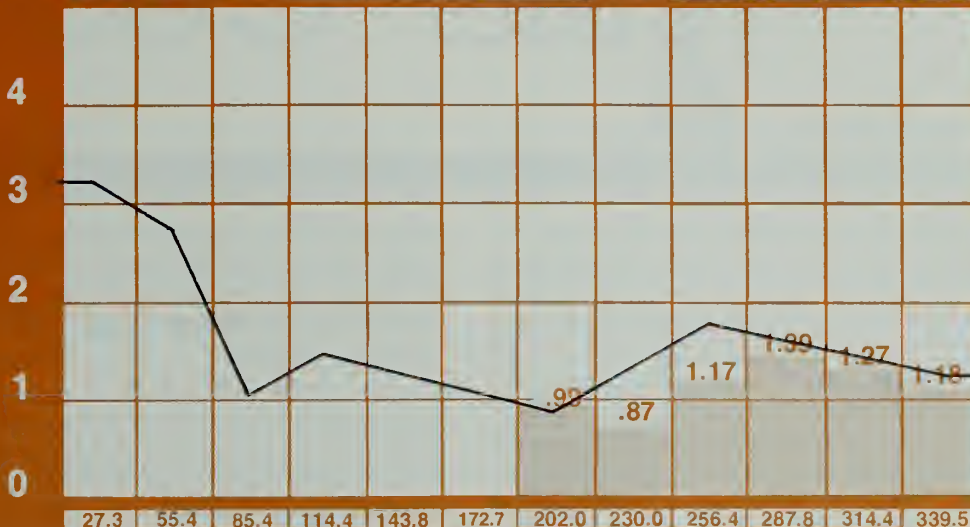


1980 Flying Safety Rate

SAC CLASS A MISHAP RATE (PER 100,000 FLYING HRS)

1979 RATE

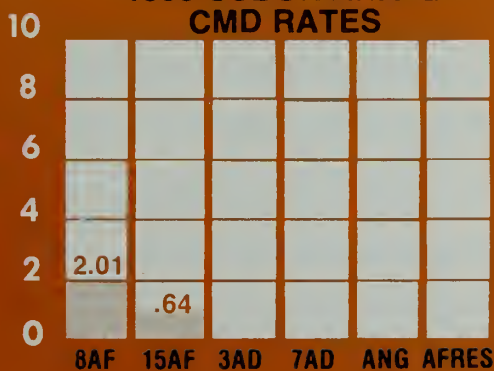
3.33 1.72 1.11 1.65 1.30 1.09 0.94 1.22 1.84 1.65 1.50 1.41



CUMULATIVE FLYING TIME (1,000 HRS)

MISHAPS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1979	1	0	0	1	0	0	0	1	2	0	0	0
1980	0	0	0	0	0	0	2	0	1	1	0	0

1980 SUBORDINATE CMD RATES



LEGEND = 1979 RATE (SAC)
+ = ANG
• = AFRES

MISHAP STATUS

KC-135A	JULY 80
FB-111A	JULY 80
B-52	SEP 80
FB-111	OCT 80

BIG INSTRUMENT

THE OCEAN

Captain James M. Sullivan
1st Combat Evaluation Group
Barksdale Air Force Base, Louisiana

Emphasis on realistic training and deployment exercises have given crew members the opportunity to fly in various environments away from the proverbial flagpole. Red Flag, Maple Flag, and Coronet exercises can be as exciting as they are valuable—sometimes very exciting. Some of these and other exercises and deployments take our aircraft completely out of the air traffic control environment we are familiar with during day-to-day operations.

I'm talking about the Oceanic areas which bound the U.S. and other countries and where the concept of positive radar separation does not exist and where unfamiliarity may breed a certain apprehension. At a minimum, there isn't a SAC pilot around (including this one) who hasn't stuttered during his first experience at Oceanic position reports. I still listen to our MAC counterparts whose mid-ocean reports are transmitted with such professional ease. Ah, well—practice makes perfect.

A few words on Oceanic Air Traffic Control, its services and responsibilities seem appropriate in the hope of clarifying or refreshing our knowledge of the subject. FLIP General Planning, the Enroute Supplement, and FAA Handbooks 7110.65 and 7110.83 provide the source material for this discussion.

Let's first consider our communication responsibilities. Communication procedures are located in the back of the Enroute Supplement. Communications are normally transmitted through USAF HF/SSB Airways stations who

relay requests and instructions between aircraft and Air Traffic Control. Specific Airways stations are assigned Primary Guard for airspace areas, and should be used for routine communications.

The initial, or departure, report should be transmitted according to the format in Section D of the Supplement. Additional position reports will be made in accordance with Oceanic procedures in FLIP/GP. For example, assume your track is East to West. You should report over each 10 degree meridian of Longitude providing you traverse 10 degrees within one hour and twenty minutes. If aircraft speed precludes crossing 10 degrees longitude in that time, report every five degrees. The report will include your present position (latitude, longitude, time, and altitude), your estimated next position, and the estimated time to that position. At times you may have difficulty contacting the Airway station who has your primary guard. No problem! Simply contact another station or aircraft and ask that your information be relayed. Simple enough—and not unlike position reports at home when operating in a non-radar environment.

But how about all of those other aircraft you hear? How do you avoid them? Relax! There's more to it than the "same sky-same day" theory. While Oceanic Control does not provide the radar separation with which you are familiar at home, Oceanic Air Traffic Control service applies certain clearance minima designed to

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separate you from controlled traffic within the Oceanic Controlled Airspace. When radar coverage is not adequate, ATC will provide a minimum of either vertical, horizontal (either longitudinal or lateral), or composite separation.

Vertical separation is simply the assignment of different altitudes to insure that up to FL 290, aircraft are separated by a minimum of 1,000 feet. Above FL 290, the separation increases to a minimum of 2,000 feet.

Longitudinal separation is based on various formulas too detailed for discussion here. Generally—but not exclusively—this procedure separates aircraft below FL 200 by 20 minutes and those at or above FL 200 by 15 minutes. Controllers may use the “Math Technique” to reduce the separation time in certain circumstances. The pilot is responsible for maintaining the assigned speed. Should aircraft performance prevent you from maintaining the assigned Mach, advise ATC and the controller will issue a new clearance providing another type of separation.

Lateral separation generally provides 100 NM separation on non-intersecting flight paths. Other criteria apply when flight paths intersect, according to formulas in 7110.83. Composite separation is applied to aircraft operating on published organized track systems, and utilizes a combination of one-half lateral and one-half vertical minima for the area of operation.

A military aircraft commander may, when operational requirements dictate, fly in accordance with the “due regard” option. In this case, he is obligated to separate his aircraft from other traffic and assure that a military unit assumes responsibility for search and rescue. Further, he must operate under at least one of the following conditions:

- (1) in VMC.
- (2) within radar surveillance and radio communications of the surface radar facility.
- (3) be equipped with airborne radar sufficient to provide separation between his aircraft and any other aircraft he may be controlling and other aircraft.
- (4) outside controlled airspace.

NOTE: These are *oceanic* procedures, folks. No fair declaring “due regard” to Denver ARTCC. They might get very upset!

We have discussed communication requirements and procedures. We have discussed air traffic control as it applies to Oceanic airspace. While you may find these procedures strange at first, I think you’ll agree that Oceanic operations are not much different than your normal training operations. The Oceanic air environment is unfamiliar to some, but certainly not unsafe. A sound knowledge of your own responsibilities is one good way to keep it that way. A working knowledge of the ATC service should help you understand the minor clearance delays and restrictions you might someday encounter.

Enjoy your flight—and the Ocean Air.

PROFESSIONAL PERFORMERS

HEADS UP

Captain Regner Rider, aircraft commander, and Captain Jeffrey Main, copilot, Crew S-02, distinguished themselves during a B-52D critical inflight emergency. Soon after takeoff, an explosion occurred causing visible shaking in the throttles and rudder pedals. Simultaneously, number eight engine flamed out, body fire warning lights three, five, seven and eight illuminated and smoke filled the forward crew compartment.

Capt Rider immediately lowered the landing gear, leveled off and started a turn back to the airfield. He declared an emergency after he had the aircraft under control. A significant air bleed leak was suspected due to the numerous fire warning lights, but the leak check proved inconclusive. Due to calm winds, Capt Rider requested approach clearance against traffic for landing. Soon thereafter, the body fire warning lights went out and the smoke dissipated. The copilot noted the number five, six and seven engine throttles were binding, thus restricting power control of the engines. After several minutes of delicately working the throttles, they became more responsive and the remaining seven engines indicated normal operation. On final approach, the copilot attempted normal flap extension but found they would not move from the full up position. The pilot elected to overfly the airfield and hold at a safe altitude to further assess the situation. After discussion with the command post, the pilot determined it was safe to extend the flaps using the emergency



system and elected to land the aircraft at a heavier than normal gross weight. He believed prolonged flight would jeopardize the crew's safety and hinder their chances of a safe landing. The seven-engine landing was uneventful.

Postflight inspection confirmed a ruptured air bleed duct and evidence to support signs of a massive air bleed leak. Due to the explosion, the number eight engine throttle cable was found to be completely broken and the number five, six and seven throttle cables were severely frayed. Maintenance teams reported that these cables would have also broken in a matter of minutes. Other damage indicated signs of severe heat that could have resulted in a massive explosion. This was prevented by the pilot's rapid response in lowering the landing gear and shutting down the air conditioning system. Capt Rider and Capt Main reacted with precision and accuracy. Their alertness and expert systems knowledge averted a potential disaster.



MAINTENANCE MAN

A1C Bernard P. Cruz, 46th CAMS, Peterson AFB, has been selected Strategic Air Command Maintenance Airman of the Month. Assigned to the T-33 Inspection Section, Airman Cruz fills a supervisory duty position well beyond his present grade level. As Chief Inspector for the T-33 aft sections, he recently identified worn parts not required for inspection by the work cards but which were approaching critical limits. He coordinated and discussed the problem with his supervisors and Quality Control. He documented his findings and disseminated the information to higher levels of command for resolution. Airman Cruz has been evaluated on various maintenance tasks by Quality Control eight times, and has successfully passed them all. Demonstrating further evidence of his ability, the Hq SAC MSET awarded him the squadron's only outstanding rating for a task evaluation. Airman Cruz is an extremely valuable asset to his unit, the Strategic Air Command and the United States Air Force.



MINUTEMAN CREW

Crew R-045, 321st SMW, 1Lt Marvin J. Riedel and 2Lt Harry R. Keller, is the Minuteman Crew of the Month.

Shortly after the crew assumed command of its LCF, the squadron command post (SCP) notified the other squadron launch control centers that its missile status control console had failed. Although the SCP maintained a limited sortie command capability, control of the squadron and the SCP's missiles had to be transferred to R-045's command. Lt Riedel took command and quickly realigned squadron missile command and monitoring responsibilities. Shortly thereafter, he was alerted by the sounding of a critical alarm and the steady illumination of an execute command light. Simultaneously, Lt Keller noted a launch in process light for D-38. In less than 25 seconds, the crew inhibited in both cable and radio modes. They quickly polled the squadron's LCCs and found that similar indications had been received. All had inhibited, however D-38 failed to accept the inhibit. Lt Riedel then called the wing command post and the wing safety officer and appropriate actions were initiated. Thirteen minutes after the malfunction occurred, the missile's computer initiated an automatic restart and the missile entered the normal alignment mode. Even so, Crew R-045 directed the complete shutdown of the sortie in order to preclude all possibility of any further incident. The leadership and professionalism displayed by these officers both on and off alert make them most deserving of selection as the SAC Missile Combat Crew of the Month.



TITAN CREW

Crew S-120, 390th SMW, is SAC Titan Crew of the month. Members are: MCCC 1Lt Eugene A. Stump, DMCCC 2Lt James A. Harrison, MSAT SrA Edward A. Hallett, and BMFT A1C Allen A. Lamb.

While missile maintenance was being performed, commercial power failed. After the complex automatically transferred power to its standby diesel engine, the klaxon sounded and the commander's console indicated dangerous propellant vapors in the launch duct. The crew directed the team to evacuate the silo, and started emergency checklist actions. As the evacuating team members passed the propellant vapor sensing panel, they saw that it was reading zero and the crew determined that the klaxon had sounded as a result of a power spike during the earlier power failure. They then completed the emergency checklist and proceeded to verify the quality of the diesel power. Two malfunctions in the diesel engine lubricating system were discovered and corrected. The complex status was changed from red to site status green. Additionally, the guidance technician discovered malfunctions in the missile's guidance system and he recommended replacement of the system's instrumentation platform. The crew's performance throughout a difficult alert tour effectively prevented danger to personnel and damage to equipment.

equipment and procedures that are fully compatible with all USAF aircraft and will allow for continued duty performance within chemical warfare threat areas.

ROCKET FUEL HANDLERS CLOTHING OUTFIT

Recent experiences with personnel wearing the Rocket Fuel Handlers Clothing Outfit (RFHCO) ensemble in Titan II facilities contaminated by missile propellant vapors and the inevitable lowering of toxic vapor exposure limits by federal occupational safety and health agencies have dictated the need for development of an improved ensemble that will assure the best possible protection for our personnel. A program to provide this protection was started this year and is now finishing the first phase of a three-part development program. Since the space shuttle program has similar RFHCO requirements, the USAF has joined forces with the National Aeronautics and Space Administration (NASA) in this development endeavor. USAF and NASA specifications, standards and operational concepts are currently being finalized prior to contractor selection and product development (Phase II). Phase III of the program will be a combined development/operational test and evaluation initiative which will be conducted at all SAC Titan II bases as well as AFSC and NASA Titan operational complexes. System reliability, maintainability and utility are stated operational requirements with optimum personnel protection paramount in this RFHCO system acquisition effort. Your participation and contribution during the SAC evaluation will assist in providing operational inputs vital to the success of this program.

TEST AND EVALUATION

A vital part of system acquisition is the test and evaluation process. This process is separated into two evaluation phases: (1) development test and evaluation (DT&E) and (2) operational test and evaluation (OT&E). DT&E responsibility is assigned to and conducted by the development agency, and the using command is responsible for accomplishing OT&E programs; initial (IOT&E), qualification (QOT&E) or follow-on (FOT&E). Basically, IOT&E is required prior to the decision to go into production and uses equipment built during the research and development program, which is like the production article. FOT&E and QOT&E programs, however, are accomplished after a production decision has been made and production equipment is used. Qualification testing is used instead of initial testing when testing was not required during research and development. All

types of operational testing are conducted using operational assets to collect "real world" data, confirm development test results and employment concepts and refine production techniques and procedures. Some of the SAC life support operational test and evaluation and programs currently in progress include:

1. Aircrew flight coveralls
2. Fire retardant material
3. Aircrew flight boots
4. Aircrew flight helmets
5. Vacuum packed one-man life raft
6. Chemical warfare defense aircrew helmet
7. Chemical warfare defense ground personnel mask
8. Survival avionics tester
9. Aircrew flight jacket

STATEMENT OF OPERATIONAL NEED

System acquisition and product development begins with the Statement of Operational Need (SON). The SON begins the acquisition process and identifies a need or deficiency. Within SAC, most SONs are written within the Deputate of the Chief of Staff for Plans; although theoretically, anyone identifying a need or deficiency could write a SON. SON validation by the Air Staff justifies the need and begins system development, testing, procurement and modification (assuming Congress funds the program). Concurrent with the SON process, system concept documents are prepared to provide employment strategies and procedures. The vehicle for SON preparation and system employment concept formulation is AFR 57-1. This directive is USAF's "Bible" for system acquisition and one to be familiar with. Some of the SAC life support SONs awaiting Air Staff validation and direction include:

1. Missile Propellant Detection System
2. Escape & Evasion Chart Viewing Device
3. Improved Aircraft Fire Extinguisher
4. Communications for Fire Fighters
5. Improved Multi-Place Life Raft Packaging and Storage System
6. Alert Aircraft Maintenance Personnel Protection

Although this article has been limited to some of the life support programs managed by SAC, other life support acquisition programs are equally interesting. Future articles of this type will hopefully keep you updated. The Air Force tries to provide its people with the very best equipment available and the SAC life support acquisition program is dedicated to this cause. We will continue our efforts to provide safe and healthful working environments for all our personnel.



SAC

SAFETY SCREEN

416 BMW, Griffiss Crew R-116: P Capt Charles J Unice, CP Capt Stephen H Wallingford, N 1Lt Douglas A Emlin, BO TSgt Thomas L Van Zile

416 BMW, Griffiss Crew E-16: P Capt John R Sundy, CP 1Lt Robert D Gaudette, RN Capt James R Spitler, NN 2Lt Darryl B Kreitman, EW Capt William R Corrigan, AG Sgt Steven H Ingerick

42 BMW, Loring Crew S-02: P Maj Kermit M Barbier, CP Lt William N Berg, RN Capt Jacob M Huffman, N Capt Neil W Taylor, EWO Capt Richard P Thomas, G SrA Steven C Reinke

42 AREFS, Loring Crew E-113: P Capt Robert J Goodman, CP Capt Michael E Camp, N Capt James E Astor, BO A1C Toussaint L Dupree

407 AREFS, Loring Crew E-182: P Capt Ronald A Leger, CP Capt Roger Bailey, N Capt Arnold W Howard, BO SSgt Philip A Rogers

46 AREFS, K I Sawyer Crew S-102: P Capt James J Poland, CP 1Lt Bruce F Hurd, N Capt Joseph W Boyce, BO TSgt Walter M Buettner Jr

46 AREFS, K I Sawyer Crew S-101: P Capt Carl W Schneider, CP Capt Eugene P Harmer, N Capt Gary T Modlin, BO MSgt Leland R Haack

410 BMW, K I Sawyer Crew R-34: P Capt Keith M Green, CP Capt Guillermo R Schwartz, RN Capt Michael R Martini, N Capt James M Ford, EWO Capt David C Duryea, G SSgt Michael W Riggs

410 BMW, K I Sawyer Crew E-15: P Capt Timothy G Krysiak, CP Capt David J Wilson, RN Capt John E Grek, N 1Lt James R Biernesser, EWO Capt Kevin J Johnson, G SrA Scottie Thomas

509 BMW, Pease AFB: P Capt William J Moran (R-20), RN 1Lt Steven D Brashear (E-46)

22 BMW, March Crew R-32: P Capt Dale E Hamilton, CP Capt John G Prunty, RN Capt Stanley Howard Jr, N 2Lt John W Klise, EW 2Lt Keenan K N Fong, AG SSgt Michael L Schuster

55 SRW, Offutt Crew E-23: IP Capt Michael W McFarland, CP Capt Daniel F Stanzione, N1 Capt Steven R Nielsen, N2 1Lt Richard G Arvin

100 AREFW, Beale Crew E-121: P Capt George W Dorris, CP 1Lt Thomas D Deitmer, N Capt John T Werner, BO Sgt Bobby Blynah

319 BMW, Grand Forks Crew R-12: P Capt John Macke, CP 1Lt Terry O'Gara, N 2Lt Steve Knewitz, BO SSgt Leigh Taylor

319 BMW, Grand Forks Crew R-12: P Capt Mike McCullough, CP 1Lt Mike Sasse, RN Capt Gorden Sidwell, N Capt John Angelo, EW Capt Fred Roebke, G SrA Ralph Woodward

319 BMW, Grand Forks Crew R-12: P Capt Tom Martin, CP Capt Bill Visnovsky, RN Capt Tom Olson, N 1Lt Curt Browning, EW 1Lt Vince Vandeveld, G SrA Rick Trepus

319 BMW, Grand Forks Crew E-120: P Capt Jim Keck, CP Capt Dave Lee, N 1Lt Dave Gray, BO SrA Kevin Wesloh

319 BMW, Grand Forks Crew R-121: P Capt Pat Wray, CP 1Lt Tony Kochenash, N Capt Rocky Graziano, BO A1C Ron Combs

44 SMW, Ellsworth Crew R-073: MCCC 1Lt Rodney G Thorstrom, DMCCC 2Lt Ernest Jones Jr

90 SMW, F E Warren Crew R-119: MCCC Capt Jon K Lindsay; DMCCC 2Lt Alfred C Coxie (E-121)

101 AREFW, Bangor (MEANG): P Capt Alfred G Jenkins, CP 2Lt John L D'Errico, N Lt Col Roger D Gillis, BO TSgt Joseph F Gifford



HALL OF FAME

TACTICAL FLYING

OVER TWENTY-FOUR YEARS

170 AREFG, McGuire (NJANG) None

OVER TWENTY-TWO YEARS

171 AREFW, Greater Pittsburgh (PAANG) Mar '58

157 AREFG, Pease (NHANG) June '58

OVER TWENTY-ONE YEARS

940 AREFG, Mather (USAFR) May '59

307 AREFG, Travis Sep '59

OVER NINETEEN YEARS

151 AREFG, Salt Lake City (UTANG) Feb '61

161 AREFG, Sky Harbor (AZANG) Apr '61

126 AREFW, Chicago O'Hare (ILANG) Apr '61

134 AREFG, McGhee Tyson (TNANG) Aug '61

OVER EIGHTEEN YEARS

11 SG, Fairford Feb '62

340 AREFG, Altus Jun '62

96 BMW, Dyess Aug '62

OVER SEVENTEEN YEARS

19 BMW, Robins Aug '63

OVER SIXTEEN YEARS

160 AREFG, Rickenbacker (OHANG) Dec '64

OVER FIFTEEN YEARS

920 BMW, Mather Jul '65

OVER THIRTEEN YEARS

92 BMW, Fairchild Feb '67

55 SRW, Offutt Jul '67

2 BMW, Barksdale Aug '67

OVER ELEVEN YEARS

5 BMW, Minot Feb '69

42 BMW, Loring Sep '69

141 AREFW, Fairchild (WAANG) Oct '69

OVER TEN YEARS

28 BMW, Ellsworth May '70

OVER EIGHT YEARS

101 AREFW, Bangor (MEANG) Mar '72

306 SW, Mildenhall Apr '72

416 BMW, Griffiss May '72

305 AREFW, Grissom Aug '72

OVER SEVEN YEARS

379 BMW, Wurtsmith Apr '73

OVER SIX YEARS

931 AREFG, Grissom (USAFR) Feb '74

384 AREFW, McConnell Mar '74

189 AREFG, Little Rock (ARANG) May '74

43 SW, Andersen Dec '74

OVER FIVE YEARS

68 BMW, Seymour Johnson Sep '75

6 SW, Eielson Dec '75

ICBM

OVER SIXTEEN YEARS

1 STRAD, Vandenberg Sep '64

OVER TEN YEARS

341 SMW, Malmstrom Apr '70

OVER SEVEN YEARS

390 SMW, Davis-Monthan Jul '73

OVER SIX YEARS

351 SMW, Whiteman Oct '74

91 SMW, Minot Nov '74

OVER FOUR YEARS

321 SMW, Grand Forks Feb '76

To gain listing in the Hall of Fame, a SAC or ARF unit must be Class A mishap-free for 48 months.